PATENT
Attorney Docket No. 07619.0005

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	
Marc J.R. Leblans, et al.	Group Art Unit: 2878
Serial No.: 09/521,618	Examiner: Not assigned
Filed: March 8, 2000	
For: APPARATUS AND METHOD FOR PERFORMING AUTOFOCUSING IN A MICROSCOPE	

Assistant Commissioner for Patents
Washington, DC 20231

Sir:

INFORMATION DISCLOSURE STATEMENT UNDER 37 C.F.R. § 1.97(b)

Pursuant to 37 C.F.R. §§ 1.56 and 1.97(b), applicants bring to the attention of the Examiner the documents listed on the attached PTO 1449. To the best of applicants' knowledge, this Information Disclosure Statement is being filed before the mailing date of a first Office Action on the merits for the above-referenced application.

Copies of the listed documents are attached.

Applicants respectfully request that the Examiner consider the listed documents and indicate that they were considered by making appropriate notations on the attached form.

The following translations of the abstracts of the non-English language documents are concise statements of relevance of the non-English language documents.

1. FR 2,750,221:

The device includes a laser which generates a light beam transmitted through a microscope objective towards the surface of a sample. The reflected beam is transmitted through the objective, reflected by a beam splitter (S2) and focused in a point A3. When the microscope is aligned the point A3 is in plane normal to the optical axis of the system. A detector (D) determines the position of the point A3 relative to that of the plane. It also triggers the microscope alignment when the point is not in the plane.

2. JP 61-143709:

Purpose: To improve always the accuracy of focusing by providing a means for varying the optical path length between a prescribed imaging plane and image sensors in a manner as to obviate the generation of a dead zone in a differential signal when the magnification of an objective optical system is changed over.

Constitution: The image sensors 6, 7 for out-focusing and in-focusing are respectively in the positions of prescribed distances l, l' from imaging point A, A'. The peak positions of output curves 41 and 42 deviate largely and the dead zone is generated near the center of a differential output curve 40 as shown by said curves at a low magnification if the distances l and l' are so set that the output curves 22, 23 from the image sensors 6 and 7 overlap exactly on each other at the high magnification. The differential output in this range is substantially zero and therefore the control is not possible in this range. The accuracy of focusing is thus always improved by providing a device 50 which varies the distances l and

l' from the imaging plane to the image sensors when the objective lens is changed over.

3. JP 60-217322:

Purpose: To detect a focal shift with high sensitivity by providing two photoelectric detecting means each having a non-photosensitive body part of the almost same shape as a spot optical image, on a part of the photodetecting surface by shifting them from the image forming surface separated by a half mirror.

Constitution: A luminous flux from a light source 1 is made parallel by a lens 2, reflected by a half mirror 3 and made to form an image on a data 5 by a lens 4. Its reflected light is divided into two by a half mirror 8 through the lenses 4, 7, provided onto glass plates 9a, 10a having circular light shielding parts 9b, 10b, and photoelectrically converted 9, 10. Glass plates 9, 10, for instance, are shifted by (d) forward and backward from surfaces FP1, FP2 on which the reflected light is to be focused. Output of the detectors 9, 10 are amplified by a circuit which is not shown in the figure and denoted as A and A+B and A-B are derived and a division (A-B) / (A+B) is executed, and the lens is moved forward and backward by driving a motor 12 so that said value becomes minimum. In such a way, the focusing which is precise and has high sensitivity is executed. It is suitable for observing a pattern of a mask or a wafer.

4. JP 60-118814:

Purpose: To detect a focus by an invisible light with simple constitution, by constituting the titled device so that an image of a slit-shaped opening part on an invisible light shielding plate is projected onto the surface of an object, and

its image is formed on a two-divided photodetecting member by its reflected light.

Constitution: The image of a slit-shaped opening part on the first invisible area light shielding plate P1 is projected onto an object surface 8 by infrared rays as an invisible light emitted from a light source 1 as a passing area of the invisible light is shown by oblique lines. Its reflected light passes through the second invisible area light shielding plate P2 which has a transparent area and an opaque area against the invisible light and whose whole surface is transparent, and forms the image of a slit-shaped opening part, on a two-divided photodetecting member 15. Subsequently, output signals of each photodetector 15b, 15c of the two-divided photodetecting member 15 are compared, and the focus is detected. As a result, the stage of which the object 8 is placed is moved in the optical axis direction, a focused state is obtained automatically, and an object observation by a visible light is executed without a trouble.

5. JP 58-160907:

Purpose: To equalize the in-focus light intensity on a photodetector to the out-of-focus light intensity by providing an auxiliary lens on the image side of an objective lens and constituting an afocal system, and supplying parallel luminous flux for focus detection and utilizing the quantity of light from a light source sufficiently.

Constitution: A light beam from a small light source 16 is collimated by a collimator lens 17, reflected by a half-mirror 18 to have a slight angle to an objective lens optical axis 11a, and passed through the auxiliary lens 15 to strike a sample through half-mirrors 12 and 14 and an objective lens 11. Its

reflected light travels backward to pass through the half-mirror 18 and then enters an image sensor 18 through an infrared-ray passing filter 19 and a cylindrical lens 20. Its output signal is converted by a displacement detecting circuit 25 to generate a signal corresponding to the extent of driving of a stage 28 necessary for focusing; and the stage 28 is moved by its output sign through a motor driving circuit 26 and a motor 27 to perform focusing. Consequently, the light intensity of the photodetector 21 in an infocus state is equal to that in an out-of-focus state.

6. JP 57-64712:

Purpose: To enable automatic focusing even if there are some patterns with high or low reflection factors or different steps on the surface of a sample detecting the light reflected by the surface of the sample with the 2nd photoelectric element and controlling the strength of laser light so as to keep the detected value always constant.

Constitution: A laser spot 32 is formed on the surface of a sample by laser light generated from a semiconductor laser generator 24, the light reflected by the surface 31 of the sample is focused by an objective lens 30, reflected by translucent mirror 29 and passed through a ¼ wavelength plate 28 and the light reflected by a polarizing beams splitter 35 and reaches a focus detection optical system 37, the light is introduced into the 2nd photoelectric element 44 and the laser light from the semiconductor laser generator 24 is controlled so that the output from the photoelectric element 44 becomes constant.

7. JP 57-192909:

Purpose: To fix the strength of light reflected by a sample surface and to improve automatic focusing accuracy by subtracting the value corresponding

to other reflected light converted from a laser output from an output of a photoelectric element which receives reflected light by the sample surface and other surfaces.

Constitution: Reflected light by a Polaroid beam splitter 43 of light 23 projected from a semiconductor laser generator 20 is detected by the 3rd photoelectric element 50. The 2nd photoelectric element 41 detects a part 46 light reflected by an objective lens and a part 47 of light reflected by a sample and a detection output Va from the 3rd element 50 to which the sum of outputs Vb and Vc from the second element are outputted is converted into Vd through an amplifier 51. An output Vc from a differential amplifier 52 controls the generator 20. Thus, the generator is controlled so that the strength of the reflected light 45 from the sample surface is fixed. Therefore, focusing is precisely detected by a pinhole 32 and a photoelectric element 33 even at the movement of the sample.

8. DE 37 39 223 A1:

In a microscope having a continuously or discontinuously variable objective magnification an autofocusing system is provided whose beam path traverses the objective, is guided out of the path of the image rays between the objective and the eye-piece, and leads to at least one photo-electric detector device. At least one optical system is incorporated or can be incorporated in the beam path of the autofocusing system, which in the event of a change in the objective magnification makes possible or causes a scale alteration (change) of the at least one image produced on the detector device. The at least one optical system can be a variable power system (zoom system) with a number of lenses or fixed lens systems which can be brought into the beam

path of the focusing system. A coupling mechanism causes, in the case of a change of the objective or a change in the objective magnification, the focal length of the at least one optical system which is brought or which can be brought into the beam path of the autofocusing system to be varied correspondingly. A pattern containing a light-dark contrast is furthermore projected into the object plane, which pattern, when incident light technique is used, ensures reliable locating of the optimum focus adjustment even in the case of low object contrasts.

9. FR 2, 620,537:

Optical device for automatically focusing onto the plane of an object to be observed. According to the invention, this device comprises:

- a first means 5 for forming a parallel light beam 2;
- a semi-reflective mirror 7;
- a second, optically converging means 10 in the vicinity of the focal point 11 of which lies a reflective object 16;
- a third, optically converging means 18 receiving the beam 2' passing through the said mirror; and
- a screen 22 placed in the focal plane 20 of the focal point of the said third means 18, and comprising an edge 23 level with the optical axis 9 of the means and perpendicular to the said optical axis, two photosensitive elements 26, 27 being placed symmetrically in relation to the optical axis and perpendicular to the edge of the screen.

This submission does not represent that a search has been made or that no better art exists and does not constitute an admission that each or all of the listed

documents are material or constitute "prior art." If the Examiner applies any of the documents as prior art against any claim in the application and applicants determine that the cited documents do not constitute "prior art" under United States law, applicants reserve the right to present to the office the relevant facts and law regarding the appropriate status of such documents.

Applicants further reserve the right to take appropriate action to establish the patentability of the disclosed invention over the listed documents, should one or more of the documents be applied against the claims of the present application.

If there is any fee due in connection with the filing of this Statement, please charge the fee to our Deposit Account No. 06-0916.

Respectfully submitted,

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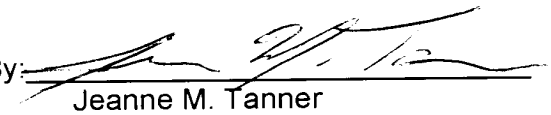
Dated: March 8, 2001

By: 
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